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Webinar

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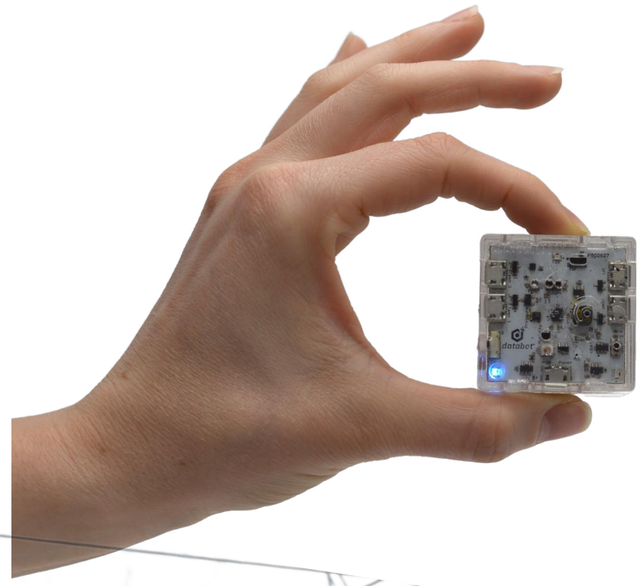
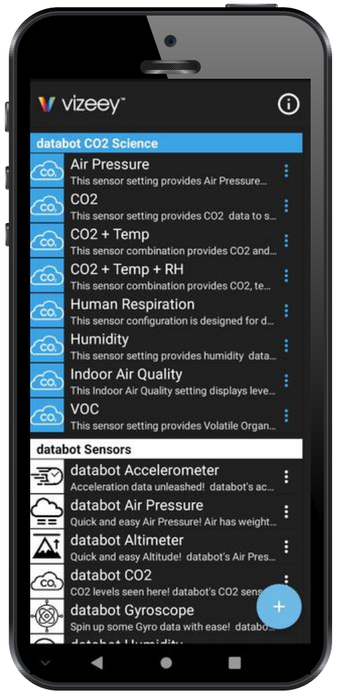
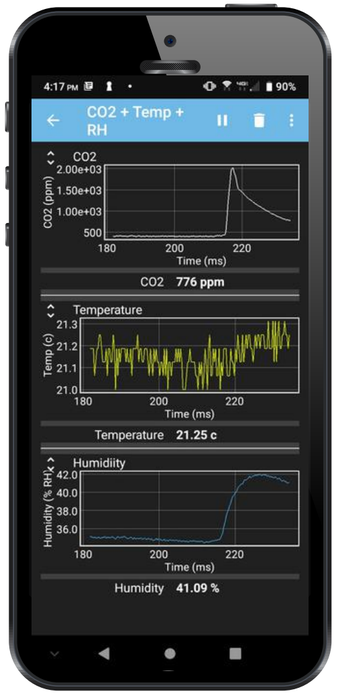
Sensor Starters with databot™







"My students love this - the live sensor data is totally engaging and fun."

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Who is databot™?

We are two founders, Robert and Heidi Grover, based out of Boise, Idaho that have been working in STEM education for over 30 years. After teaching, designing, developing, and supporting many STEM products we saw a significant need for teachers and founded databot™ to make STEM more accessible, easier, and more fun.

Our Purpose

We create sensor technology and brilliant activities that empower students everywhere to think deeply, explore with passion, and solve our planetary scale challenges using real, live data.

Robert Grover
CEO

Heidi Grover
Creative Director

Our Subject Focus

Our top picks for saving the planet!

- Science,Technology, Engineering, Arts, and Mathematics (STEAM)
- Climate Change and Environmental Awareness
- Data Science, Data Literacy, and Critical Thinking
- Artificial Intelligence & Machine Learning

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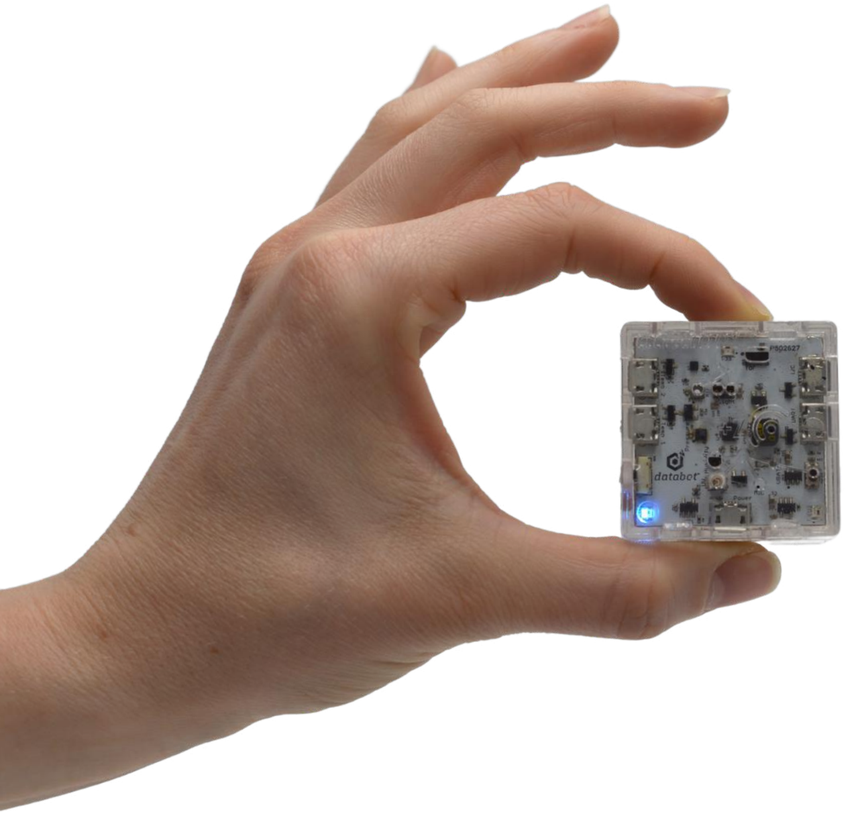
Today's Webinar



- Meet databot™ 2.0 - a wireless all-in-one sensor device
- Kit Contents
- Sensors, I/O, & Physical Computing
- How do I use this thing? FREE APP & LESSON TIME!
- The Sensor Starter Activity Format
- Sensor Starter: Acceleration
- Sensor Starter: Illuminance
- Sensor Starter: Altimeter
- Sensor Starter: Sound
- Sensor Starter: UV
- NGSS - The 4th Practice
- Other Software Options
- Expandability - Using the Grove System
- Final Use Case Overview
- Kit Configurations **& Giveaway!!!**
- Q & A

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Meet databot™!

42.5 mm x 42.5 mm x 20 mm
Weight 34 grams

Teach Chemistry, Physics, Life Science, Earth Science, Environment, AI, Coding, Math, Data Science and more with ONE device!

databot™ is a low-cost, friendly and engaging product for exploring science, data, and technology.

- 16 sensors - one device
- External temperature probe,
- 4MB of onboard storage
- Bluetooth wireless connection to Smart Devices
- WiFi Enabled for IOT
- Arduino-based device for physical computing challenges

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Kit Contents

- databot™ 2.0
- Soft Storage Case
- External Temperature Probe
- Charge & Programming Cable
- Lanyard

42.5 mm x 42.5 mm x 20 mm
Estimated weight 30 grams

11.5 mm x 11.5 mm x 5 mm
(4.5" x 4.5" x 2.5")

70 cm (27")
-55 to +125 C range

45 cm (18")
Easily added and removed.

15 cm (6")

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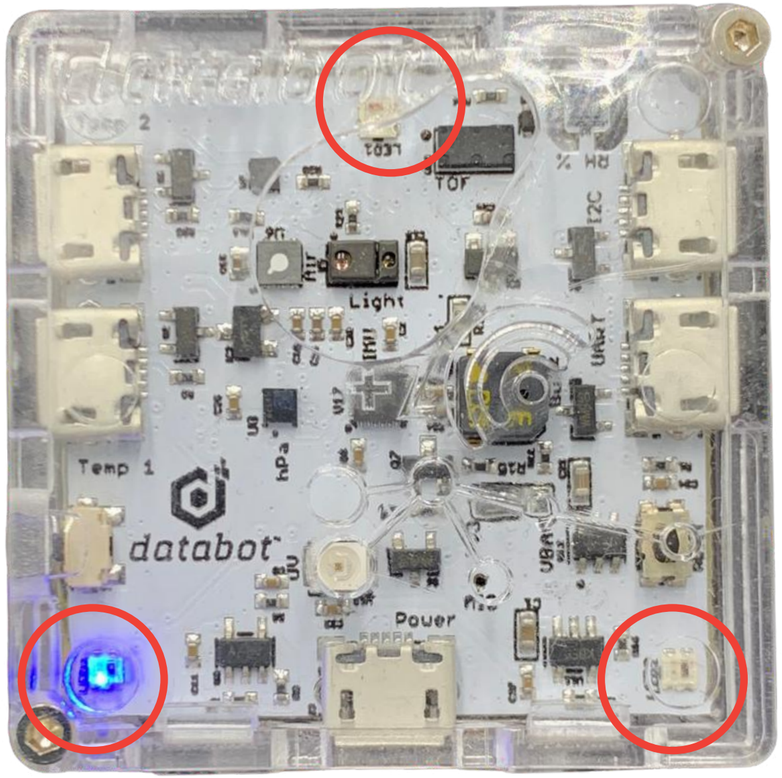
Low profile, micro USB connections. Pinouts provided for integration and hacking projects.

Two simultaneous external temperature probes supported.

Single click, on and off switch.



I2C & UART for external sensors and robotics integration.

Tone generator

3 Programmable RGB LEDs

Recharge, power, and programming

500 mAh LiPo.
<1 hr charge
4-6 hr run time

databot™

Sensors

Accelerometer
Air Pressure
Altimeter
Ambient Light
CO2
Color
Gesture
Gyroscope
Humidity
Magnetometer
Proximity (Time of Flight)
Sound
Temperature Probe
UV
Volatile Organic Compounds

Technical

ESP32 WROOM 4MB
WiFi
Bluetooth

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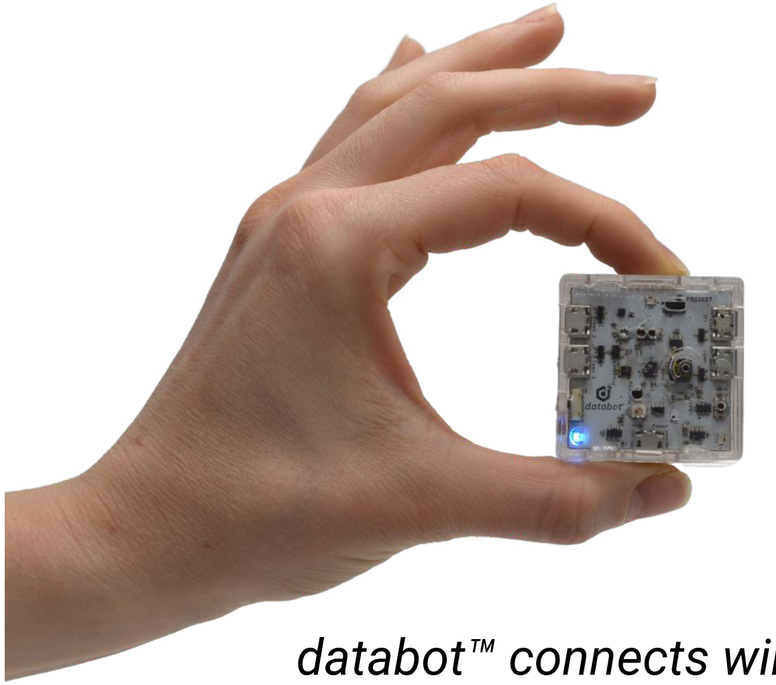
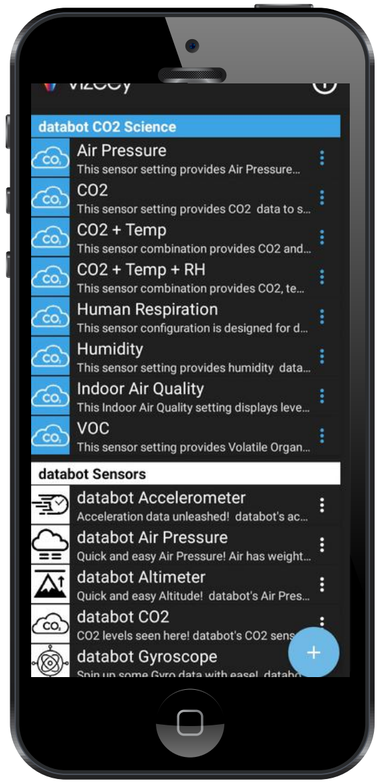
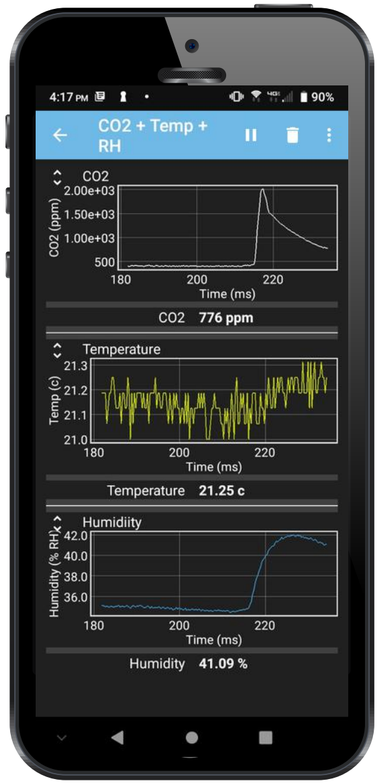
How to use databot™







databot™ connects wirelessly to the included app, Vizeey™

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How to Use databot™ - Vizeey™ Smart App

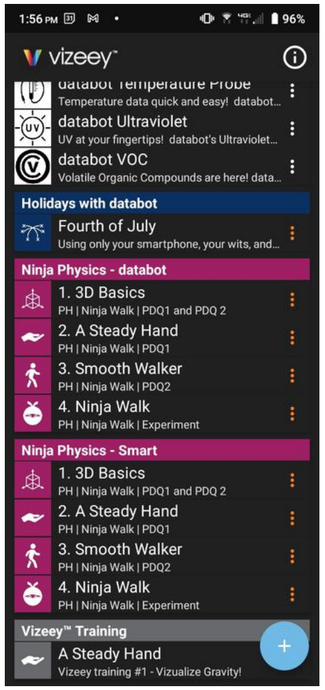
Ninja Walk

Download on the App Store

GET IT ON Google Play

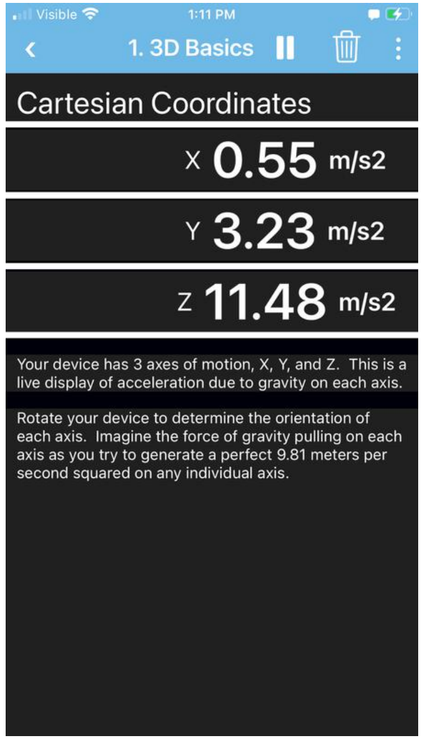
1. Download and Install Vizeey™

2. Look for the + sign and select add experiment from QR Code.



3. Scan the QR Code

4. Select 3D Basics



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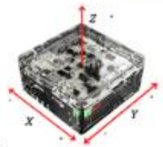
Educational Innovations LLC

Sensor Starters

ACCELEROMETER

databot Sensor Starters



Grades: 6 & Up
Time: 15 Minutes - PDQ 1 & 2
Subject: Physics, Technology
Topics: Acceleration, Speed, 3D Geometry

Meet the Accelerometer

The accelerometer senses motion and it is one of the most widely used sensors in the world. Think of all the devices that you know of that move. Cars, planes, trains, drones, game controllers, washing machines, and even your smart phone. How does your phone know to change orientation when you rotate it sideways? The accelerometer!

What Does it Measure?

The accelerometer measures acceleration, a change in speed or direction. You have no doubt experienced acceleration. For example, when a driver presses on the gas in a car it accelerates as it changes from zero to 10 mph to 20 mph and more. As the vehicle accelerates you will feel yourself pressed back into the seat. Acceleration is different than speed. Once a car reaches and holds a certain speed, say 60 mph, you are no longer accelerating as your speed is constant.

How Does it Work?

There are different types, but all accelerometers work through the use of a "mass" that moves when acceleration takes place. Just as your body is pressed back into the seat when you accelerate in a car, a mass within the accelerometer moves when accelerating. Using mechanical or electrical means to measure this movement, the sensor converts it to numbers that represent the force of acceleration.

What Are the Units for Acceleration?

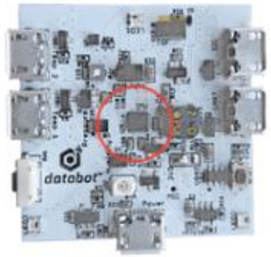
Acceleration is a "change" in speed or direction over time. Speed is distance over time such as miles per hour (mph) or kilometers per hour (kph). In physics we frequently use the units meters per second (m/s). Now, for acceleration, we add in the rate of change, which is also in seconds, so we end up with meters per second "per second" to express acceleration. This is expressed as meters per second squared or m/s2 in the units shown in Vizeey™.

What You Will Need/Prep

- databot™ 2.0 & a smart device (iOS or Android).
- Read the Vizeey™ Fast Start Guide and install Vizeey™ if you haven't already.
- Scan the QR code for Linear Acceleration if you don't have it already.

Where Does it Live?

The accelerometer is one sensor in a module called an intertial measurement unit (IMU) located in the center of the databot™ PCB. Look for the label IMU on your databot™!

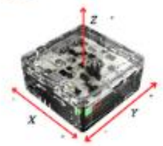


Important Terms

Acceleration: The rate of change in speed or direction. An object moving at a constant speed and direction has zero acceleration.
Accelerometer: A sensor that detects acceleration - changes in speed and direction.
Speed: The rate of change of position of an object in any direction.
Cartesian Coordinates: Describes position in three dimensions (3D) using the Cartesian coordinates X, Y, and Z.

ACCELEROMETER

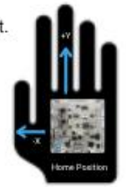
PDQ1 : 3D Thrills with databot™



Using the databot™ accelerometer it is possible to read changes in speed and direction! First, in order to understand reading "direction" - familiarize yourself with the orientation of databot™ using the 3D Cartesian Coordinate system of X, Y, and Z axes. The accelerometer reads forces across these 3 axes. Depending on what direction you move, you will see the force of acceleration on a particular axis.

1. Tap on Linear Acceleration in Vizeey™ to load the experiment & use these icons to start and to pause the experiment in the Main View:

2. Hold databot™ in the palm of your hand in the "home" position shown. You should see close to 0.0 m/s² on each axis as you hold still. Shake it to equalize the scales on the three axes - your goal is a scale of -20 to +20 on each axis. Stop, erase your data, restart as you practice until you get it.



3. Next, move databot™ forward, backward, sideways and up and down. Move with fast, uneven movements that accelerate.

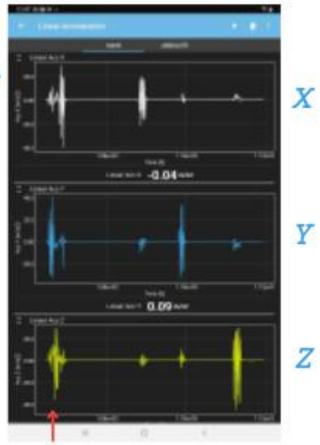
4. Watch the data visualization of acceleration and verbally say each axis as you move. Try to match the graph image shown to the right.

Shake it up!

Each axis "auto-scales based on the highest and lowest value of x, y, and z.

Start by shaking databot™ on each axis so that you get each axis to display an equal range of -20 to +20 m/s2.

This will match the 3 displays for easier comparison.



Shake | Movement on each axis.

PDQ2 : Hop, Skip, Run, Race or Jump

In this PDQ, acceleration from the x, y, and z axes is all combined into one awesome value that represents your total acceleration. With databot™ held tightly against your body, what is the highest rate of acceleration you can achieve?

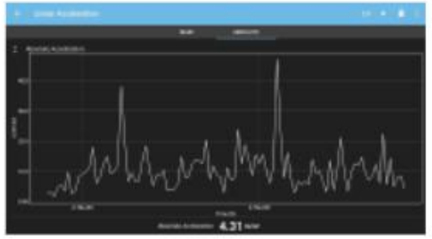
1. Tap on Linear Acceleration in Vizeey™ to load the experiment & use these icons to start and to pause the experiment:

2. Swipe left to the Absolute View.

3. Set up a Vizeey™ "Timed Run" for 10 seconds.

4. Start the countdown!

5. Hold databot™ snugly against your body holding it in your hand and placing it over your heart.



6. Now leap, cavort, run and move in your best effort to achieve a high rate of acceleration. After your ten second recording use the Vizeey™ "Pick Data" tool to identify your peak acceleration!

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Exploration: Acceleration

Jonte Lee

"This activity used the databot to calculate our acceleration based on different movements. We ran, danced, and even leaped to see change in acceleration."

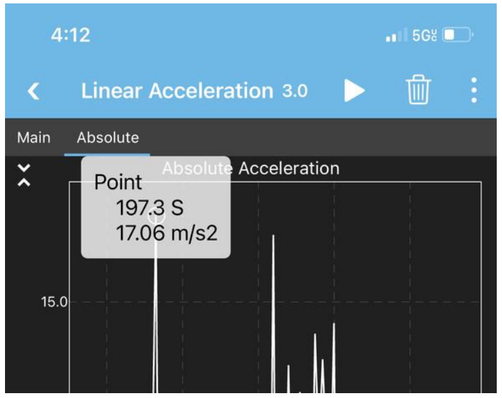
"I learned that the highest rate of acceleration I could achieve was me running or leaping including, acceleration rates being able to increase and decrease in certain directions and at different speeds."

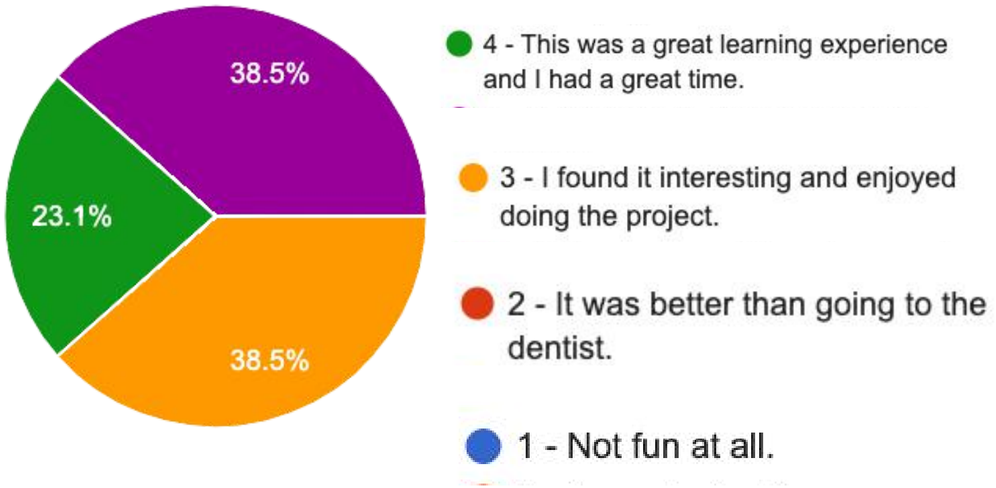
"My favorite part of this exercise is when we I saw my friend do the moon walk."

"I learned that all accelerometers work through mass that moves when you run or change direction."

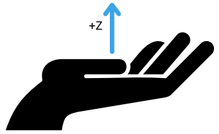
"This activity's purpose was to measure the acceleration, the change of the speed or direction."

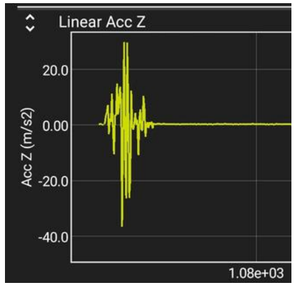
"I learned what the cartesian coordinates are."

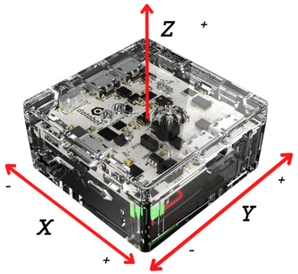




Students explore acceleration and 3D geometry through matching acceleration patterns on the x, y, and z axes. Then, using an absolute acceleration value, students attempt jump, cavort, twist etc. in a timed challenge to reach the highest acceleration level.







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Exploration: Illuminance

Jonte Lee

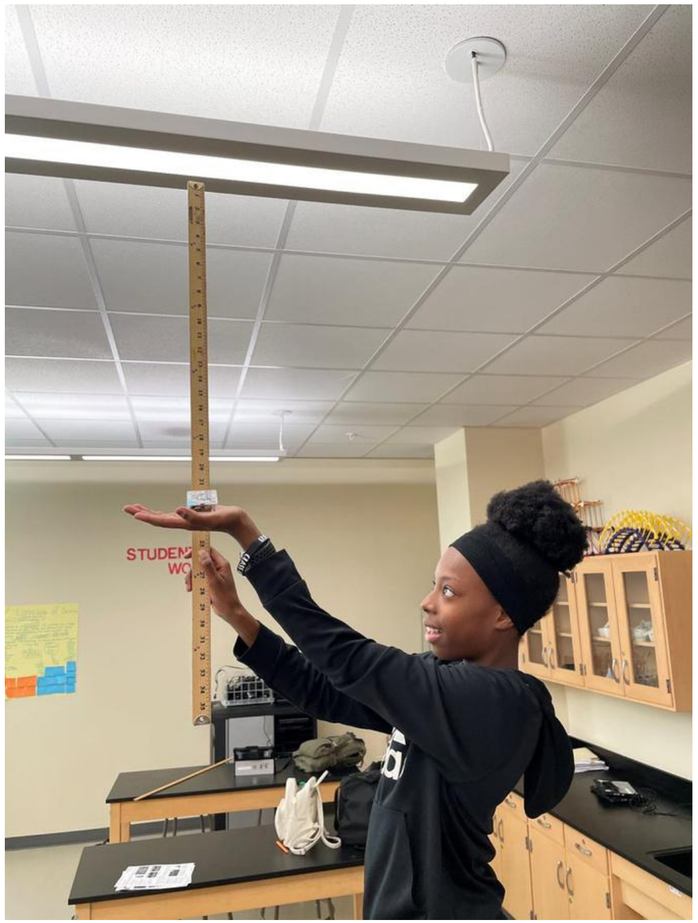
"My favorite part was collecting the data."

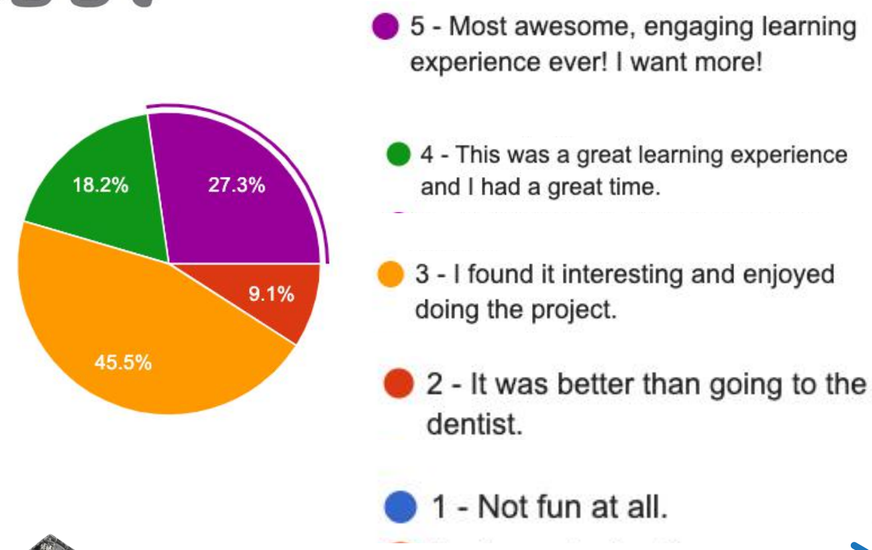
"Something i learned is that light is measured in Lux."

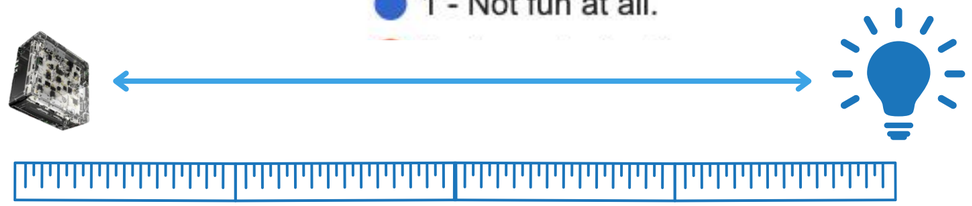
"My favorite part of the experiment was seeing the ambient light difference from the sun and lights in the building."

"I learned that the illuminance varies on how far away you are from the light source."

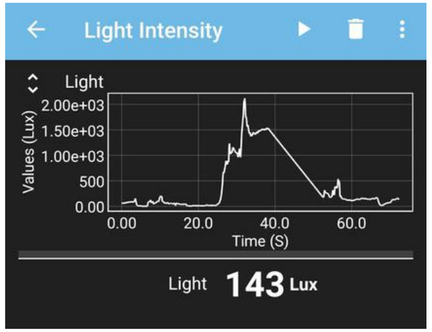
"My favorite part of the activity was finding the the brightest and dimmest spot because I never have done that before."



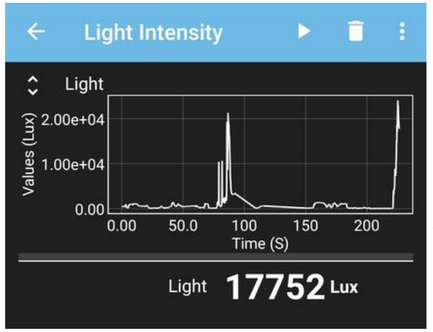




Illuminance when the distance is 100 cm from the light source.



Illuminance when the distance is 20 cm from the light source



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Exploration: Altimeter

Jonte Lee

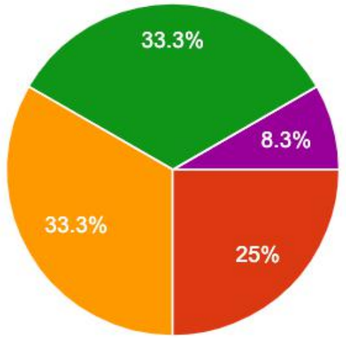
"The purpose of this activity was to calculate the current altitude based on the air pressure."

"One thing I learned is how the Altimeter uses the air pressure to determine the altitude."

"My favorite part was looking up the altitude of the school and then comparing it to the current altitude because you got to see real data against data that was already taken."

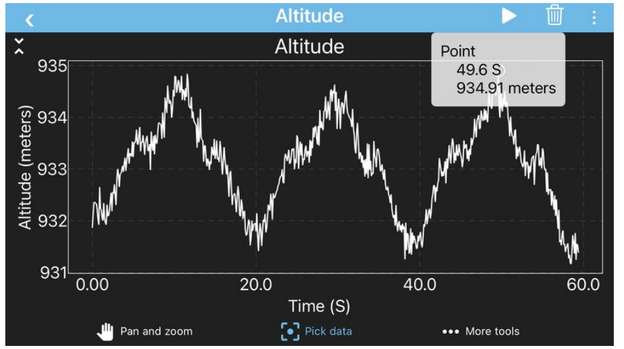
"I learned that when the altitude increases the air pressure decreases as there is less air above us."

"My favorite part was trying to find my altitude on google maps."



- 5 - Most awesome, engaging learning experience ever! I want more!
- 4 - This was a great learning experience and I had a great time.
- 3 - I found it interesting and enjoyed doing the project.
- 2 - It was better than going to the dentist.
- 1 - Not fun at all.

Students learn how air pressure is used to calculate altitude, calibrate for their local altitude, then conduct experiments to determine the accuracy of the altimeter by going up and down stairs.



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Exploration: Sound Intensity

Jonte Lee

"The purpose of this activity was to check sound intensity with the databot. It is used to convert sound waves to digital data."

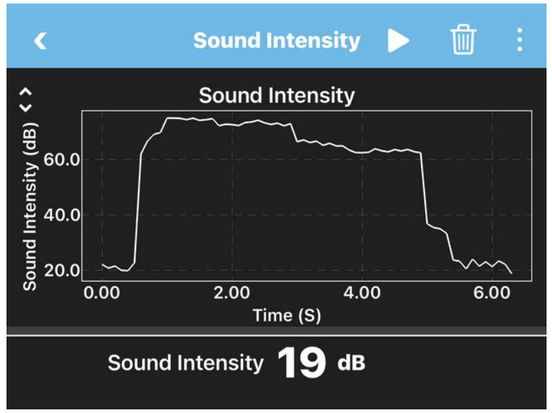
"Something I learned from this experiment is that the higher the amplitude the louder the noise."

"My favorite part of the activity was screaming and changing the sound of my voice to create the different patterns of the graphic display."

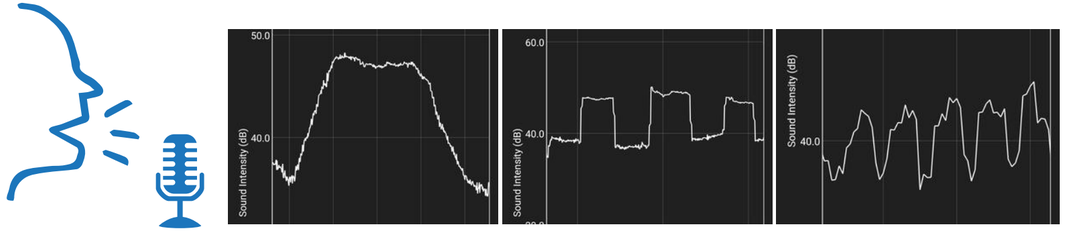
"I learned that a higher amplitude does not always guarantee a change in frequency.."

"I enjoyed creating the different waves using different sounds because my ability to make different noises to make different waves was cool and interesting to me."

"I learned that the sound sensor is actually used in smartphones, microphones, video cameras, etc."



Students explore amplitude by trying to match data graphs using their voices, then use data analytics to predict intensity changes based on distance from the source.



Round mound *Square waves* *Triangular spikes*

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Exploration: Ultraviolet Radiation

Jonte Lee

"The activity had us to go to a window or and open space with sunlight then to go outside in the sun to see if the UV stayed the same. The purpose was to see if it stayed the same, then it's a bad sign because sunlight is harmful and building are supposed to protect you from that."

"I learned that the UV index determines how much sun protection you need to go outside."

"My favorite part was collecting the data."

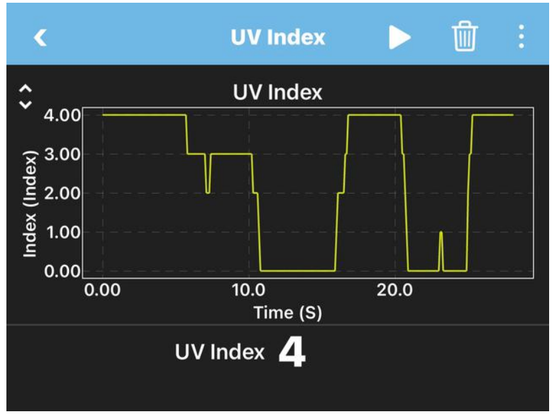
"I learned that UV is different from light that can be seen with the human eye because it has longer wavelengths and is invisible to the human eye."

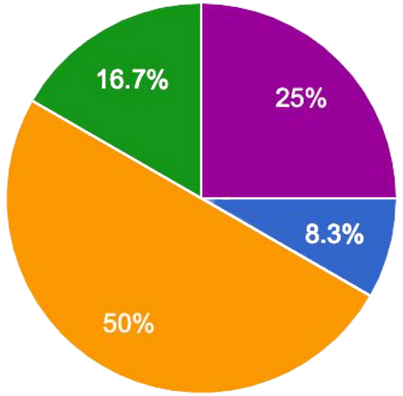
.

"We tested the UV light from the sun by angling the databot to a certain point that showed the UV levels."

"I learned about the UV in my city. The UV was strong."

"My favorite part of the activity was being outside to get the UV data. I liked being outside."





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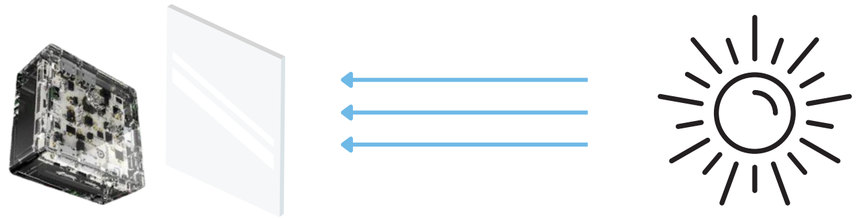
- 1 - Not fun at all.

Students explore the Global Solar UV Index levels and learn the dangers involved with UV ray exposure. They use online tools to find the UV index for their area, then test it themselves. Additionally, they test for materials that block UV rays seeking a material that will cut the index reading in half.



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Exploration: Drone Challenge

Lesson Learned: Piloting drones require practice!

Jonte Lee

"We flew the drones around in our school and collected data. The purpose of this activity is to measure the height of the ceilings in our school."

"I learned more about altitude with this because at the drone flew up the altitude became higher and as it got lower the altitude became lower."

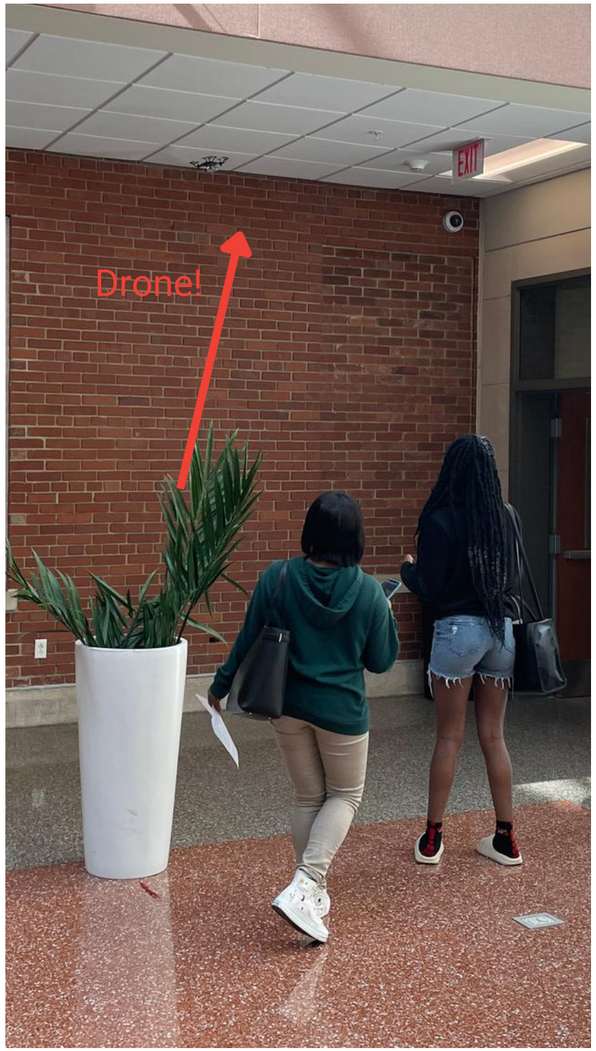
"The purpose of the activity was to use a drone to measure the height of the ceiling using altimeters."

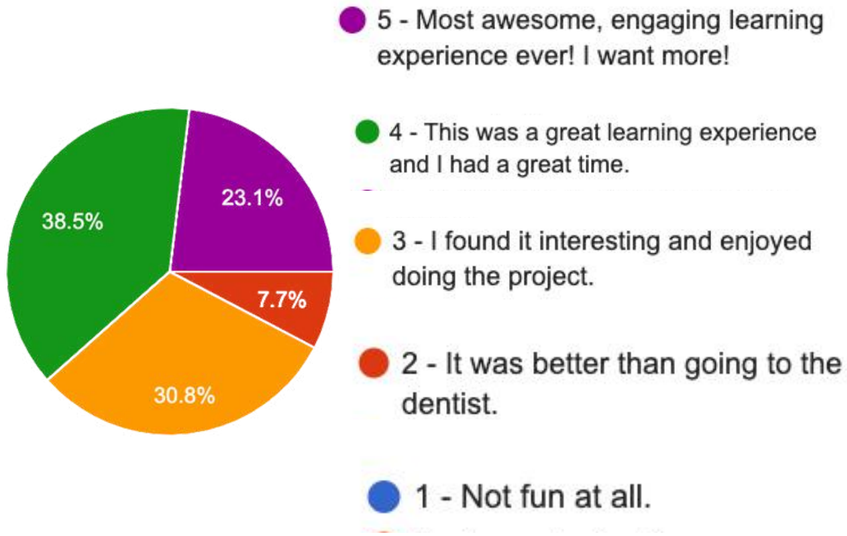
"We were not able to complete the activity because we did not have enough time to work with the drone."

"The databot ran smoothly yet the Tello app for the drone was quite confusing so it was difficult to master the drone and determine the proper height."

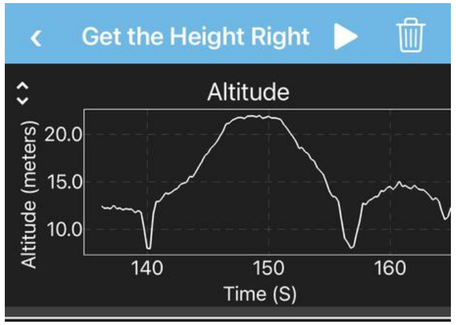
"We were not able to calculate anything because of technical difficulties involving the drone."

"My favorite part was flying the drone because it was fun to watch the data change."





The Drone Master series pairs databot™ with drones (usually Tello) to conduct data collection and flight challenges. In this challenge, Get the Height Right, students work together to use sensors to measure the height of room ceilings.



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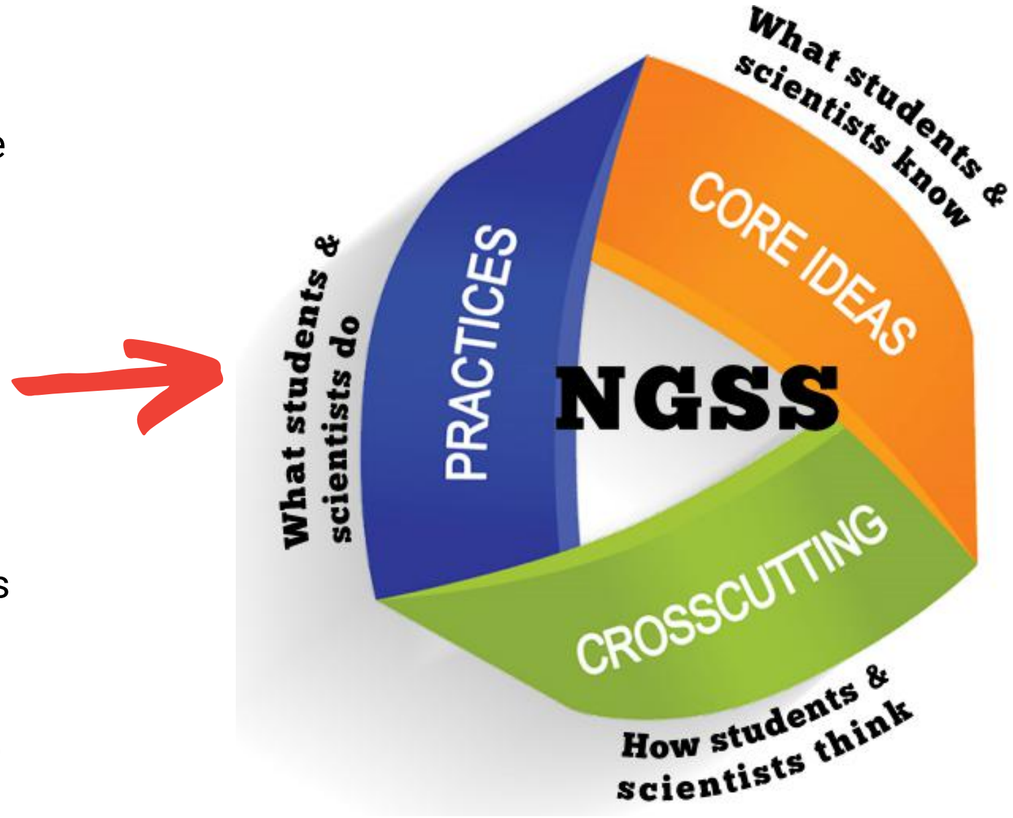
Mastering the NGSS 4th Practice

The Next Generation Science Standards (NGSS) are an impressive body of work developed to guide science education for the 21st century.
One of the three cornerstones of the NGSS are the eight Science and Engineering Practices that are identified as essential for all students to learn.



Importantly, the **4th practice is Analyzing and Interpreting data**. Whenever students are conducting data oriented activities such as those using databot™, they are applying this practice – an invaluable skill that can be applied to careers of the 21st century. The more comfortable we make our students with data today, the more successful they will be tomorrow.

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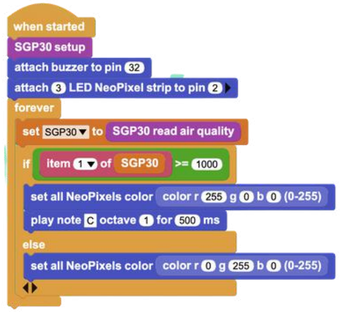
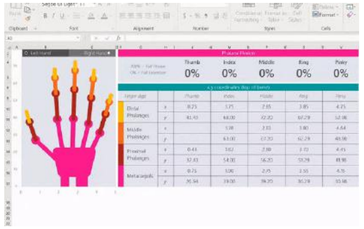
Out of the box databot™ connects to our free App Vizeey™ for easy experiment setup, data collection, visualization, analysis and export.

MicroBlocks
The fastest drag and drop coding environment on the planet!



Microsoft Data Streamer:
Enabling live serial data streaming directly into Excel.



Google:
Tools for IOT data aggregation, dashboards, analytics.

Google Sheets Data Studio

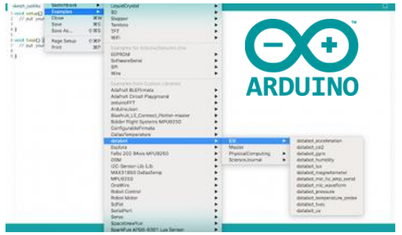
Platforms for physical computing, data science, cybersecurity, ML & more.

python™

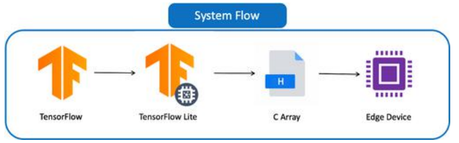
Data Science Tools:
Rich experiences in applied mathematics and data science.

desmos GeoGebra jupyter

Arduino:
Over 30 million makers inventing, coding, and creating.



TensorFlow:
Edge computing & ML



Software Integrations

databot™ disrupts physical computing through integration with multiple coding, math, and data visualization platforms. One device with extraordinary breadth.

Ubiquity

- Arduino IDE
- Anaconda
- Jupyter Notebook
- Python
- Desmos
- DroneBlocks
- Excel & Data Streamer
- GeoGebra
- Google Sheets
- Google Data Studio
- Mblock
- Cognimates
- MakeCode
  - Drag and Drop
  - Javascript
  - Python
  - Minecraft
- MQTT
- Micropython
- Scratch w/ AI
- TensorFlow
- Labview
- Matlab

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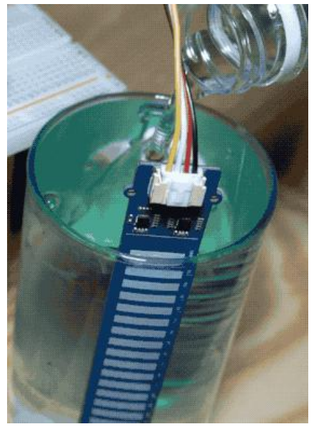
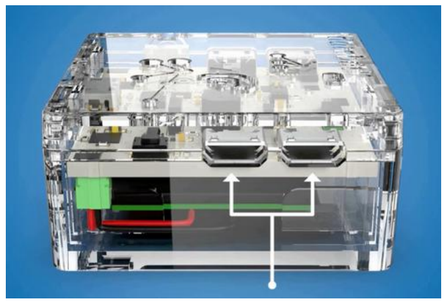
databot™ 2.0 Expansion Using the Grove System

Grove is an open source, low-cost, toolset developed to facilitate modular exploration of electronics. The system includes a variety of 3.3v sensors that can be easily added to databot 2.0 using our custom MicroUSB - Grove connector cable.





- Electricity
- Soil Moisture
- Turbidity
- Heart Rate
- Electromyography (EMG)
- Fingerprint

- Gas: O2
- Gas: MQ2 Combustible Gas, Smoke
- Gas: MQ3 Alcohol Vapor
- Gas: MQ5 LPG, Natural Gas, Town Gas
- Gas: MQ9 Carbon Monoxide, Coal Gas, Liquefied Gas

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databot™ Use Cases: One Device, Many Applications!

Amazing versatility

STEM Programs

- Engaging Activities
- Camp Format Curriculum Available
- Easy to learn and manage
- Integrates with existing materials like LEGO, VEX, and other systems
- Tough and versatile

Career & Technical Education

- Coding - Arduino IDE, Python
- Design Challenges
- Open Hardware - Electronics
- Data Science
- Physical Computing
- IOT

Science Education

- Grades 4-12
- Hands-on experiments
- Robust data visualization tools
- Easy-to-implement and train
- Classroom tough

Math Education

- Data literacy
- Applied Mathematics

Higher Education

- Highly versatile for science studies
- Open Arduino hardware for EE
- Computer Science

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databot™ 2.0 Raffle! Good Luck!

databot™ 2.0 Product Configurations

Single - The Classic!
$189.99

Twin Pack - 2 'bots!
$375

Class Pack - 10 'bots!
$1,850

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Q & A

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Welcome to the databot™ family!

For more information:

info@teachersource.com

See the Sensor Starters and Resources Here

https://www.teachersource.com/product/databot-2